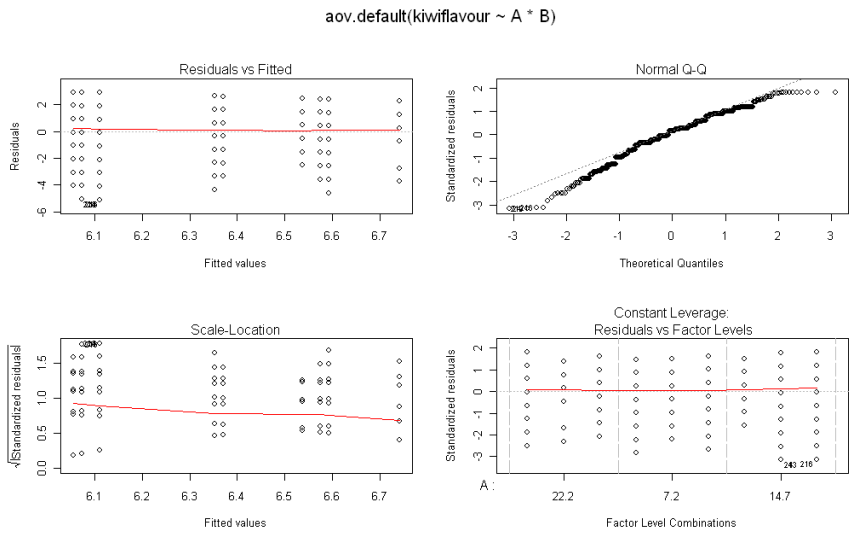
Kiwi flavour

```
library(DoE.base)
nozzle <- fac.design(nfactors= 2,replications= 54,repeat.only=FALSE,randomize= F,seed= 24024 ,nlevels=c(3,3),factor.names=list(A=c(7.2,14.7,22.2),B=c(8,10,12)))
kiwiflavour<-c(8,7,7,7,5,6,7,7,6,5,5,5,3,5,5,6,4,7,6,7,6,7,3,1,5,2,4,9,6,6,8,7,7,4,3,6,6,6,4,7,8,9,7,6,
4,6,8,5,6,7,5,7,6,7,7,7,7,6,6,4,4,6,7,7,8,8,7,5,7,8,7,8,8,7,6,7,7,6,7,7,7,8,9,9,7,7,8,8,9,9,8,9,8,8,7,8,
7,8,8,4,5,5,6,7,9,8,8,5,3,3,7,4,7,5,5,7,8,7,6,7,6,6,6,6,6,7,8,8,8,8,8,8,8,8,8,7,8,7,8,7,4,6,6,8,8,8,7,8,
7,8,5,6,6,2,6,7,6,7,2,6,8,3,5,7,8,8,8,8,7,7,6,5,7,6,7,7,8,8,6,7,7,7,8,7,7,7,8,8,8,7,6,7,7,6,7,5,7,6,6,8,
8,7,7,8,7,9,9,9,2,7,7,7,1,3,4,1,7,6,7,7,5,7,8,5,7,6,7,6,6,8,6,6,6,5,9,9,9,9,8,8,8,8,8,7,7,6,6,6,6,7,7,6,
8,9,8,9,8,8,8,8,8,4,8,4,9,6,9,9,6,9,7,6,6,6,6,6,6,7,6,6,6,6,6,7,7,6,6,7,6,6,8,7,8,5,7,5,5,9,7,8,9,9,9,9,
9,9,7,6,7,7,6,6,6,6,6,3,8,4,3,7,4,8,8,9,2,5,6,7,5,4,4,5,1,4,7,7,6,8,8,7,7,6,7,7,7,7,5,6,4,6,6,5,5,6,7,3,
6,6,6,6,5,7,6,6,8,7,6,6,6,3,4,7,6,6,6,6,6,6,3,6,6,4,4,5,5,6,5,9,8,4,7,6,8,6,8,3,3,5,4,4,4,4,3,4,4,5,4,4,
8,7,4,6,6,2,7,7,8,8,8,8,8,8,8,8,7,6,8,7,3,8,6,4,5,6,7,7,8,6,5,7,6,6,5,5,4,4,5,4,5,5,6,7,6,7,8,5,7,7,7,4,
8,9,8,8,7,7,4,4,7,8,8,7,8,6,7,7,7,3,5,5,7,6,4,5,3,2)
nozzle$kiwiflavour<-kiwiflavour
nozzle.aov<-aov(kiwiflavour~A*B,data=nozzle)
summary(nozzle.aov)

oldpar<-par(oma=c(0,0,3,0),mfrow=c(2,2))
plot(nozzle.aov)
par(oldpar)
```



Remove 2 assessors

```
library(DoE.base)
nozzle <- fac.design(nfactors= 2,replications= 52,repeat.only=FALSE,randomize= F,seed= 24024 ,nlevels=c(3,3),factor.names=list(A=c(7.2,14.7,22.2),B=c(8,10,12)))
kiwiflavour<-c(8,7,7,7,5,6,7,7,6,5,5,5,3,5,5,6,4,7,6,7,6,7,3,1,5,2,4,9,6,6,8,7,7,4,3,6,6,6,4,7,8,9,7,6,
4,6,8,5,6,7,5,7,6,7,7,7,7,6,6,4,4,6,7,7,8,8,7,5,7,8,7,8,8,7,6,7,7,6,7,7,7,8,9,9,7,7,8,8,9,9,8,9,8,8,7,8,
7,8,8,4,5,5,6,7,9,8,8,5,3,3,7,4,7,5,5,7,8,7,6,7,6,6,6,6,6,7,8,8,8,8,8,8,8,8,8,7,8,7,8,7,4,6,6,8,8,8,7,8,
```

```
7,8,5,6,6,2,6,7,6,7,2,6,8,3,5,7,8,8,8,8,7,7,6,5,7,6,7,7,8,8,6,7,7,7,8,7,7,7,8,8,8,7,6,7,7,6,7,5,7,6,6,8,
8,7,7,8,7,9,9,
7,6,7,7,5,7,8,5,7,6,7,6,6,8,6,6,6,5,7,7,6,6,6,6,7,7,6,8,9,8,9,8,8,8,8,8,4,8,4,9,6,9,9,6,9,7,6,6,6,6,6,6,
7,6,6,6,6,6,7,7,6,6,7,6,6,8,7,8,5,7,5,5,5,9,7,8,9,9,9,9,9,9,7,6,7,7,6,6,6,6,6,3,8,4,3,7,4,8,8,9,2,5,6,7,5,
4,4,5,1,4,7,7,6,8,8,7,7,6,7,7,7,7,5,6,4,6,6,5,5,6,7,3,6,6,6,6,5,7,6,6,8,7,6,6,6,3,4,7,6,6,6,6,6,6,3,6,6,
4,4,5,5,6,5,9,8,4,7,6,8,6,8,3,3,5,4,4,4,4,3,4,4,5,4,4,8,7,4,6,6,2,7,7,8,8,8,8,8,8,8,8,7,6,8,7,3,8,6,4,5,
6,7,7,8,6,5,7,6,6,5,5,4,4,5,4,5,5,6,7,6,7,8,5,7,7,7,4,8,9,8,8,7,7,4,4,7,8,8,7,8,6,7,7,7,3,5,5,7,6,4,5,3,
2)
nozzle$kiwiflavour<-kiwiflavour
nozzle.aov<-aov(kiwiflavour~A*B,data=nozzle)
summary(nozzle.aov)
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
A	2	5.06	2.5278	1.0196	0.3616
B	2	2.27	1.1368	0.4585	0.6325
A:B	4	18.29	4.5726	1.8444	0.1192
Residuals	459	1137.94	2.4792		

```
 oldpar<-par(oma=c(0,0,3,0),mfrow=c(2,2))
 plot(nozzle.aov)
 par(oldpar)
 percentcows<- rep(c(rep(c(7.2),times=3),rep(c(14.7),times=3),rep(c(22.2),times=3)),times=52)
 percentkiwi<- rep(c(rep(c(8),times=1),rep(c(10),times=1),rep(c(12),times=1)),times=156)
 nozzle.rsm <- data.frame(percentcows,percentkiwi,kiwiflavour)
 nozzle.rsm

library(rsm)
 nozzle.CR <- coded.data(nozzle.rsm,x1~(percentcows-14.7)/7.5,x2~(percentkiwi-10)/2)
 nozzle.rs<- rsm(kiwiflavour ~ SO(x1,x2), data=nozzle.CR)
 summary (nozzle.rs)
Call:
rsm(formula = kiwiflavour ~ SO(x1, x2), data = nozzle.CR)

Residuals:
```

Min	1Q	Median	3Q	Max
-5.3568	-0.6068	0.3932	1.3932	3.0118

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	6.60684	0.16292	40.554	<2e-16 ***
x1	-0.02564	0.08923	-0.287	0.7740
x2	-0.04167	0.08923	-0.467	0.6408
x1:x2	-0.20192	0.10929	-1.848	0.0653 .
x1^2	-0.14103	0.15456	-0.912	0.3620
x2^2	-0.20833	0.15456	-1.348	0.1783

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.576 on 462 degrees of freedom
Multiple R-squared: 0.01359, Adjusted R-squared: 0.002912
F-statistic: 1.273 on 5 and 462 DF, p-value: 0.2744

Analysis of Variance Table

Response: kiwiflavour

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
FO(x1, x2)	2	0.75	0.3734	0.1503	0.8605
TWI(x1, x2)	1	8.48	8.4808	3.4137	0.0653
PQ(x1, x2)	2	6.58	3.2911	1.3248	0.2669
Residuals	462	1147.75	2.4843		
Lack of fit	3	9.81	3.2699	1.3190	0.2676
Pure error	459	1137.94	2.4792		

Stationary point of response surface:

x1	x2
-0.02958105	-0.08566457

Stationary point in original units:

percentcows	percentkiwi
14.47814	9.82867

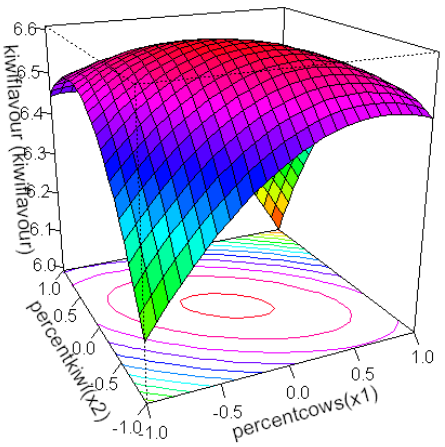
Eigenanalysis:

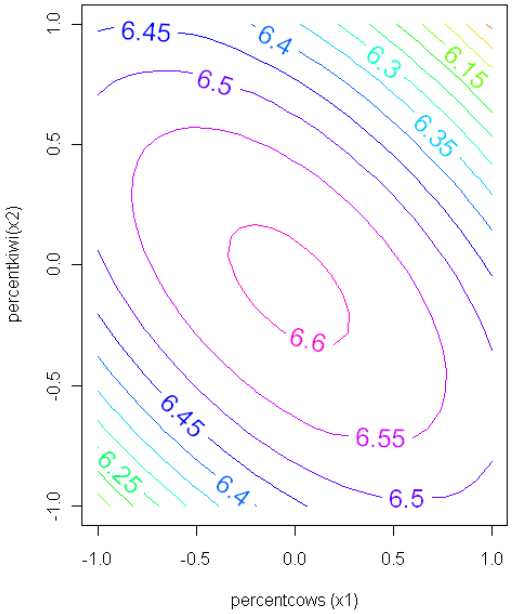
$values
[1] -0.06825668 -0.28110229

$vectors

	[,1]	[,2]
[1,]	-0.8112422	0.5847103
[2,]	0.5847103	0.8112422

```
 par(mfrow = c(1, 2))
 persp(nozzle.rs,~x1+x2, at=canonical(nozzle.rs)$xs,col = rainbow(50), contours = "colors",xlabs = c("percentcows(x1)","percentkiwi(x2)"),zlab = "kiwiflavour (kiwiflavour)",cex.lab=1.2)
 contour(nozzle.rs,~x1+x2, at=canonical(nozzle.rs)$xs,xlab = c("percentcows (x1)","percentkiwi(x2)"),col = rainbow(15),labcex=1.5)
```


kiwiflavour (kiwiflavour)
6.6
6.5
6.4
6.3
6.2
6.1
6.0
percentkiwi(x2)
1.0
0.5
0.0
-0.5
-1.0
percentcows(x1)
-1.0
-0.5
0.0
0.5
1.0


6.45
6.4
6.3
6.15
6.5
6.35
6.6
6.55
6.45
6.25
6.4
6.5
percentkiwi(x2)
1.0
0.5
0.0
-0.5
-1.0
-1.0
-0.5
0.0
0.5
1.0
percentcows (x1)